

WHAT IS CLAIMED IS:

- 1 1. A current-in-plane (CIP) GMR sensor, comprising:
2 a GMR sensor stack;
3 a spacer layer formed over a free-layer of the GMR sensor stack; and
4 an in-stack biasing layer disposed over the spacer.

- 1 2. The CIP GMR sensor of claim 1, wherein the in-stack biasing layer
2 comprises materials selected from the group consisting of NiFe, CoFe, NiFeCr, NiFe_x
3 and CoFe_x.

- 1 3. The CIP GMR sensor of claim 1 further comprising lead layers formed on
2 either side of the GMR sensor stack.

- 1 4. The CIP GMR sensor of claim 3, wherein the lead layers comprises a layer
2 of Rhodium disposed adjacent to the GMR sensor stack, a Tantalum layer formed over
3 the layer of Rhodium and a layer of Platinum-Manganese formed over the layer of
4 Tantalum.

- 1 5. The CIP GMR sensor of claim 4, wherein the layer of Platinum-
2 Manganese is formed adjacent a portion of the in-stack bias layer.

1 6. The CIP GMR sensor of claim 3, wherein the in-stack biasing layer
2 comprises a bias layer formed only over the spacer and a coupling layer formed over the
3 bias layer and the layer of Platinum-Manganese.

1 7. The CIP GMR sensor of claim 6, wherein the bias layers and coupling
2 layer each comprise a material selected from the group consisting of NiFe, CoFe, NiFeCr,
3 NiFe_x and CoFe_x.

1 8. The CIP GMR sensor of claim 1 further comprising a cap layer formed
2 over the in-stack bias layer.

1 9. A magnetic storage system, comprising:
2 a magnetic storage medium having a plurality of tracks for recording of data; and
3 a current-in-plane (CIP) GMR sensor maintained in a closely spaced position
4 relative to the magnetic storage medium during relative motion between the magnetic
5 transducer and the magnetic storage medium, the CIP GMR sensor further comprising:
6 a GMR sensor stack;
7 a spacer layer formed over a free-layer of the GMR sensor stack; and
8 an in-stack biasing layer disposed over the spacer.

1 10. The magnetic storage of claim 9, wherein the in-stack biasing layer
2 comprises materials selected from the group consisting of NiFe, CoFe, NiFeCr, NiFe_x
3 and CoFe_x.

1 11. The magnetic storage of claim 9 further comprising lead layers formed on
2 either side of the GMR sensor stack.

1 12. The magnetic storage of claim 11, wherein the lead layers comprises a
2 layer of Rhodium disposed adjacent to the GMR sensor stack, a Tantalum layer formed
3 over the layer of Rhodium and a layer of Platinum-Manganese formed over the layer of
4 Tantalum.

1 13. The magnetic storage of claim 12, wherein the layer of Platinum-
2 Manganese is formed adjacent a portion of the in-stack bias layer.

1 14. The magnetic storage of claim 11, wherein the in-stack biasing layer
2 comprises a bias layer formed only over the spacer and a coupling layer formed over the
3 bias layer and the layer of Platinum-Manganese.

1 15. The magnetic storage of claim 9, wherein the bias layer and the coupling
2 layer each comprise a material selected from the group consisting of NiFe, CoFe, NiFeCr,
3 NiFe_x and CoFe_x.

1 16. The magnetic storage of claim 9 further comprising a cap layer formed
2 over the in-stack bias layer.

1 17. A method for providing a current-in-plane (CIP) GMR sensor with an
2 improved in-stack bias layer with a thinner sensor stack, comprising;
3 forming a thin spin valve stack;
4 forming a spacer over the spin valve stack;
5 forming lead layers in a passive region outside the track;
6 forming an in-stack bias layer over the spacer for biasing a free-layer of the spin
7 valve stack; and
8 forming a cap over the bias layer.

1 18. The method of claim 17, wherein forming the lead layers further
2 comprises forming a layer of Rhodium adjacent to the GMR sensor stack, forming a
3 Tantalum layer over the layer of Rhodium and forming a layer of Platinum-Manganese
4 over the layer of Tantalum.

1 19. The method of claim 18, wherein the forming of the layer of Platinum-
2 Manganese further comprises forming the layer of Platinum-Manganese adjacent a
3 portion of the in-stack bias layer.

1 20. The method of claim 18, wherein the in-stack bias layer comprises a bias
2 layer formed only over the spacer and a coupling layer formed over the bias layer and the
3 layer of Platinum-Manganese.

1 21. The method of claim 17, wherein the forming of the bias layer and the
2 coupling layer each further comprises using a material selected from the group consisting
3 of NiFe, CoFe, NiFeCr, NiFe_x and CoFe_x.